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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09/985,886 | 11/06/2001 | Nambirajan Seshadri | 1875.1290002 | 4549 |
| 26111 | 7590 | 05/18/2005 | EXAMINER | |
| STERNE, KESSLER, GOLDSTEIN & FOX PLLC 1100 NEW YORK AVENUE, N.W. WASHINGTON, DC 20005 | | | ZHENG, EVA Y | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 2634 | |

DATE MAILED: 05/18/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/985,886

Applicant(s)

SESHADRI ET AL.

Examiner

Eva Yi Zheng

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 November 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-48 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 44-47 is/are allowed.
- 6) ☒ Claim(s) 1-4 and 48 is/are rejected.
- 7) ☒ Claim(s) 5-43 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 6/10/02, 7/19/02
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Objections

1. Claim 48 is objected to because of the following informalities: on line 1-2, please change recitation: "comprising the steps" to – comprising the steps of: --.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claim 4 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim recitation: "wherein the coding gain distance" is confusing and indefinite since it was never present in it's independent claim.

4. Claim 48 recites the limitation "the diverse transmission scheme" in line 3. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 1, 2 and 4 are rejected under 35 U.S.C. 102(e) as being anticipated by Hammons, JR. et al (US 2004/0146014 A1).

a) Regarding claim 1, Hammons, JR. disclose a telecommunications system, comprising:

a transmitter (52 in Fig. 2) having an encoder (58 in Fig. 2) that implements a multi-state trellis code; and

at least two transmission elements coupled to the transmitter (transmission antennas 70a, 70b in Fig. 2), wherein, during operation, the encoder:

receives a group of input data bits (N bits/frame, input of block 58 in Fig. 2),

selects a particular space-time block code from a set of space-time block codes, based on the group of input bits and a state of the encoder (inherent as block 98 and 100 in Fig. 3; Page 4, [0054]),

selects at least two modulation symbols, one symbol for each of the at least two transmission elements, based on the group of input bits and the state of the encoder (as shown 102a, 102b in Fig. 3), and

encodes the group of input data bits, using the particular space-time block code and the at least two modulation symbols, for transmission by the at least two transmission elements (as shown in Fig. 2).

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b) Regarding claim 2, Hammons, JR. disclose the system of claim 1, wherein the at least two transmission element are antennas (transmil antennas 70a, 70b in Fig. 2).

c) Regarding claim 4, Hammons, JR. disclose the system of claim 1, wherein the coding gain distance of the multi-state trellis code is maximized ([0340]).

7. Claims 1, 2 and 4 are rejected under 35 U.S.C. 102(e) as being anticipated by Popovic (US 6,804,307 B1).

a)Regarding claim 1, Popovic disclose a telecommunications system, comprising:

 a transmitter (Fig. 3A)) having an encoder (350 in Fig. 3A) that implements a multi-state trellis code; and

 at least two transmission elements coupled to the transmitter (antennas 370 and 380 in Fig. 3A), wherein, during operation, the encoder:

 receives a group of input data bits (201 in Fig. 2),

 selects a particular space-time block code from a set of space-time block codes, based on the group of input bits and a state of the encoder (200 in Fig. 2),

 selects at least two modulation symbols, one symbol for each of the at least two transmission elements, based on the group of input bits and the state of the encoder (200 in Fig. 2), and

 encodes the group of input data bits, using the particular space-time block code and the at least two modulation symbols, for transmission by the at least two transmission elements (as shown in Fig. 2).

- b) Regarding claim 2, Popovic disclose the system of claim 1, wherein the at least two transmission element are antennas (antennas 370 and 380 in Fig. 3A).
- c) Regarding claim 4, Popovic disclose the system of claim 1, wherein the coding gain distance of the multi-state trellis code is maximized (Col 10, L2-10)

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hammons, JR. et al (US 2004/0146014 A1).

Regarding claim 3, Hammons, JR. et al disclose all the subject matters described above except for the specific teaching of the two transmission elements are optical transmitters. However, such limitation is merely a matter of design choice and would have been obvious in the system of Hammons, JR. et al. Hammons, JR. et al teaches a space-time coding modulation and specifically disclose encoding and decoding of space-time system. The limitation in claim 3 does not define a patentably distinct invention over that in Hammons, JR. et al since both the invention as a whole and Hammons, JR. et al are directed to space-time system. The type of transmitters for the invention as a whole and presents no new or unexpected results, so long as the space-time block codes are transmitted and received successfully. Therefore, to have optical

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transmitters in Hammons, JR. et al would have been a matter of obvious design choice to one of ordinary skill in the art.

Allowable Subject Matter

10. Claims 5-43 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

11. Claims 44-47 are allowed.

12. The following is an examiner's statement of reasons for allowance:

None of the prior art teaches or suggests a telecommunication system, in particular, a space-time block coding, comprising a receiver having a decoder that decodes a multi-state trellis code; and at least one receiver element couple to the receiver, wherein the decoder decodes received information signals encoded using at least two orthogonal space-time block codes of a form

$$C(x_1, x_2, \theta) = \begin{pmatrix} x_1 e^{j\theta} & x_2 \\ -x_2^* e^{j\theta} & x_1^* \end{pmatrix}$$

And in another form of:

$$C(x_1, x_2, \theta) = \begin{pmatrix} x_1 e^{j\theta} & x_2 e^{j\theta} \\ -x_2^* & x_1^* \end{pmatrix}$$

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eva Yi Zheng whose telephone number is (571) 272-3049. The examiner can normally be reached on 7:30-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Chin can be reached on (571) 272-3056. The fax phone number for the organization where this application or proceeding is assigned is 703-879-9306.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks

Washington, D.C. 20231

or faxed to:

(703) 872-9314 (for Technology Center 2600 only)

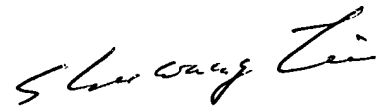
Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington, VA, Sixth Floor (Receptionist).

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Technology Center 2600 Customer Service Office whose telephone number is (703) 306-0377.

May 9, 2005

Eva Yi Zheng
Examiner
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A handwritten signature in black ink, appearing to read "Shuwang Liu".

SHUWANG LIU
PRIMARY EXAMINER